

1997 Chevrolet S10 Pickup

A/C-HEATER SYSTEM TROUBLE SHOOTING - MANUAL 1997 A/C-HEATER SYSTEMS General Motors - Manual
A/C-Heater System Trouble Shooting

A/C-HEATER SYSTEM TROUBLE SHOOTING - MANUAL

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MODEL IDENTIFICATION

BODY DESIGNATIONS

Body Code	Models
Cars ⁽¹⁾	
"F"	Camaro, Firebird
"H"	Boneville, Eighty Eight, LeSabre, LSS, Regency
"J"	Cavalier, Sunfire
"L/N"	Achieva, Cutlass, Grand Am, Malibu, Skylark
"W"	Century, Cutlass Supreme, Grand Prix
"W"	Lumina, Monte Carlo, Regal
"Y"	Corvette
Trucks/Vans ⁽²⁾	
"C"	2WD Pickup, Sierra, Suburban, Tahoe & Yukon
"G"	Express, Savanna & Van
"K"	4WD Pickup, Sierra, Suburban, Tahoe & Yukon
"L"	AWD Astro & Safari
"M"	2WD Astro & Safari
"P"	Commercial Van/Motorhome
"S"	2WD Blazer, Jimmy, Pickup & Sonoma
"T"	4WD Blazer, Bravada, Jimmy, Pickup & Sonoma
"U"	Silhouette, Trans Sport & Venture
(1) Body codes determined by fourth character of VIN code.	
(2) Vehicle series is fifth character of VIN code.	

COMPRESSOR APPLICATIONS

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Application ⁽¹⁾	Compressor

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"C" Body	Harrison V5 5-Cyl.
"E" Body	Harrison HD6/HR-6HE 6-Cyl.
"K" Body	Harrison HD6/HR-6HE 6-Cyl.
"F" Body	
3.8L V6	Harrison V5 5-Cyl.
5.7L V8	Harrison HD6/HT6 6-Cyl.
"G" Body	Harrison HD6/HT6 6-Cyl.
"H" Body	Harrison HD6/HT6 6-Cyl.
"J" Body	Harrison V5 5-Cyl.
"L/N" Body	Harrison V5 5-Cyl.
"V" Body	Harrison V5 5-Cyl.
"W" Body	Harrison V5 5-Cyl.
"Y" Body	Harrison V5/V7
"Z" Body (Saturn)	Zexel Rotary Vane

(1) Body codes determined by fourth character of VIN code.

COMPRESSOR APPLICATIONS

Application ⁽¹⁾	Compressor
"C" & "K" Series	Harrison HD6/HT6 6-Cyl.
"G" Series	Harrison HD6/HT6 6-Cyl.
"L" & "M" Series	Harrison HD6/HT6 6-Cyl.
"P" Series	Harrison HD6/HT6 6-Cyl.
"S" & "T" Series	
2.2L	Harrison V5 5-Cyl.
4.3L	Harrison HD6/HT6 6-Cyl.
"U" Series	Harrison V5 5-Cyl.

(1) Series codes determined by fifth character of VIN code.

OPERATIONAL TESTING

When trouble shooting and diagnosing an air conditioning system, always refer to appropriate vacuum and wiring diagrams for the system involved. See appropriate A/C-HEATER SYSTEM - MANUAL article.

If blower operates at all speeds and compressor clutch engages, electrical circuits are functioning properly. If evaporator inlet pipe and accumulator surface appear to be the same temperature when felt by hand, system is properly charged with refrigerant. Ensure vacuum and diaphragm function properly when moving selector control.

ELECTRICAL TROUBLE SHOOTING

BLOWER MOTOR WILL NOT RUN

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Check fuses. Turn ignition switch to RUN position. Check for voltage at function control switch. Switch blower switch to HI position. Check for voltage at switch and at high-speed blower relay. Ground blower motor with ignition switch in RUN position. If blower operates, motor is okay.

BLOWER DOES NOT OPERATE IN HI

Check for voltage at high-speed blower relay with ignition switch in RUN position and blower switch in HI position. If voltage is not present, check for voltage at blower switch.

BLOWER OPERATES ONLY IN HI

Check blower resistors for open condition. Check blower switch for voltage at each position.

A/C DOES NOT WORK

With engine running and function control switch at NORM position, check for voltage at pressure cycling switch. Check for voltage between pressure cycling switch and compressor clutch. Ground compressor clutch circuit. If clutch engages, check wide-open throttle cut-out switch and A/C compressor cut-off switch.

REFRIGERANT SYSTEM DIAGNOSIS

INSUFFICIENT COOLING

NOTE: Quick check procedure may be used to check for proper refrigerant charge, provided ambient temperature is more than 70°F (21°C). On vehicles with Cycling Clutch Orifice Tube (CCOT) system, compressor will cycle on and off to meet system requirements.

Quick Check Procedure

1. Engine must be at normal operating temperature. Open vehicle doors and hood. Select MAX A/C or RECIRC mode. Move temperature lever to COLD position. Blower switch in HIGH position. Engine should be at normal idle speed.
2. While compressor is engaged, feel temperature of accumulator surface and evaporator inlet pipe. If temperature of both components is the same, system is normal. If evaporator inlet pipe is frosted or feels cooler than accumulator surface, refrigerant charge is low.
3. Add refrigerant in 4-ounce increments, allowing system to stabilize between additions, until accumulator and inlet pipe are the same temperature. Add an additional 14 ounces of refrigerant.

Thorough Check Procedures

Begin diagnosis at **V5/TXV SYSTEM DIAGNOSIS (STEP 1)** or **V5/VDOT SYSTEM DIAGNOSIS (STEP 1)**. For further diagnosis, go to appropriate trouble shooting chart. See **TROUBLE SHOOTING CHART DIRECTORY**.

V5/TXV SYSTEM DIAGNOSIS (STEP 1)

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Preliminary Checks

Check and repair the following:

- Connect Tech 1 Scan Tool. Check for stored trouble codes. If codes are found, see the TESTS W/CODES article in the ENGINE PERFORMANCE section.
- Check A/C fuse.
- Check A/C blower operation.
- On vehicles with cable operated temperature door, move temperature lever rapidly from cold to hot. Listen for temperature door hitting travel stops at each end. Adjust as necessary.
- Check A/C compressor clutch coil connection.
- Check A/C pressure transducer connection.
- Check compressor belt condition. Adjust or replace as necessary.
- Check cooling fan operation.
- Check for restricted airflow across condenser.
- Check Technical Service Bulletins (TSBs) for A/C system updates.

V5/VDOT SYSTEM DIAGNOSIS (STEP 1)

Preliminary Checks

Check and repair the following:

- Check A/C fuse.
- Check A/C blower operation.
- On vehicles with cable operated temperature door, move temperature lever rapidly from cold to hot. Listen for temperature door hitting travel stops at each end. Adjust as necessary.
- Check clutch coil and connections at rear head switch(es).
- Check compressor belt condition. Adjust or replace as necessary.
- Check cooling fan operation.
- Check for restricted airflow across condenser.
- Check Technical Service Bulletins (TSBs) for A/C system updates.

If discharge air temperature with A/C on is normal after making repairs, system is operating properly. If further trouble shooting is required, go to appropriate trouble shooting chart. See **TROUBLE SHOOTING CHART DIRECTORY** .

TROUBLE SHOOTING CHART DIRECTORY ⁽¹⁾

Application	Figures
CCOT System	<u>Fig. 1 -Fig. 5</u>
V5/TXV System	<u>Fig. 6 -Fig. 12</u>
V5/VDOT System	<u>Fig. 13 -Fig. 19</u>

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- (1) Vehicles with Harrison V5 5-cylinder compressor use a Variable Displacement Orifice Tube (VDOT) or Thermal Expansion Valve (TXV) system, referred to as V5/VDOT and V5/TXV systems. Vehicles with any other compressor use the Cycling Clutch Orifice Tube (CCOT) system.

INSUFFICIENT COOLING DIAGNOSIS CHARTS - (CCOT)

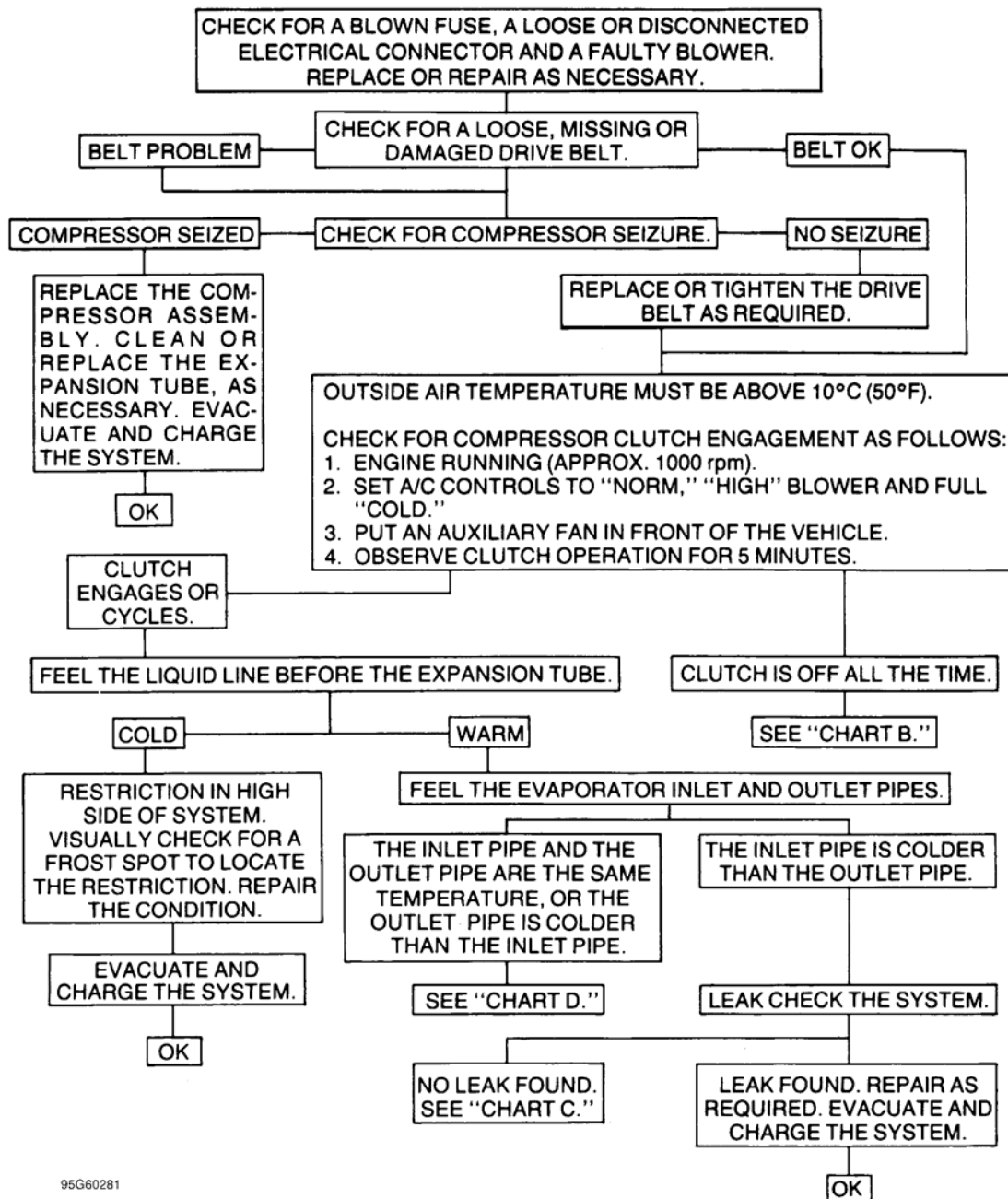
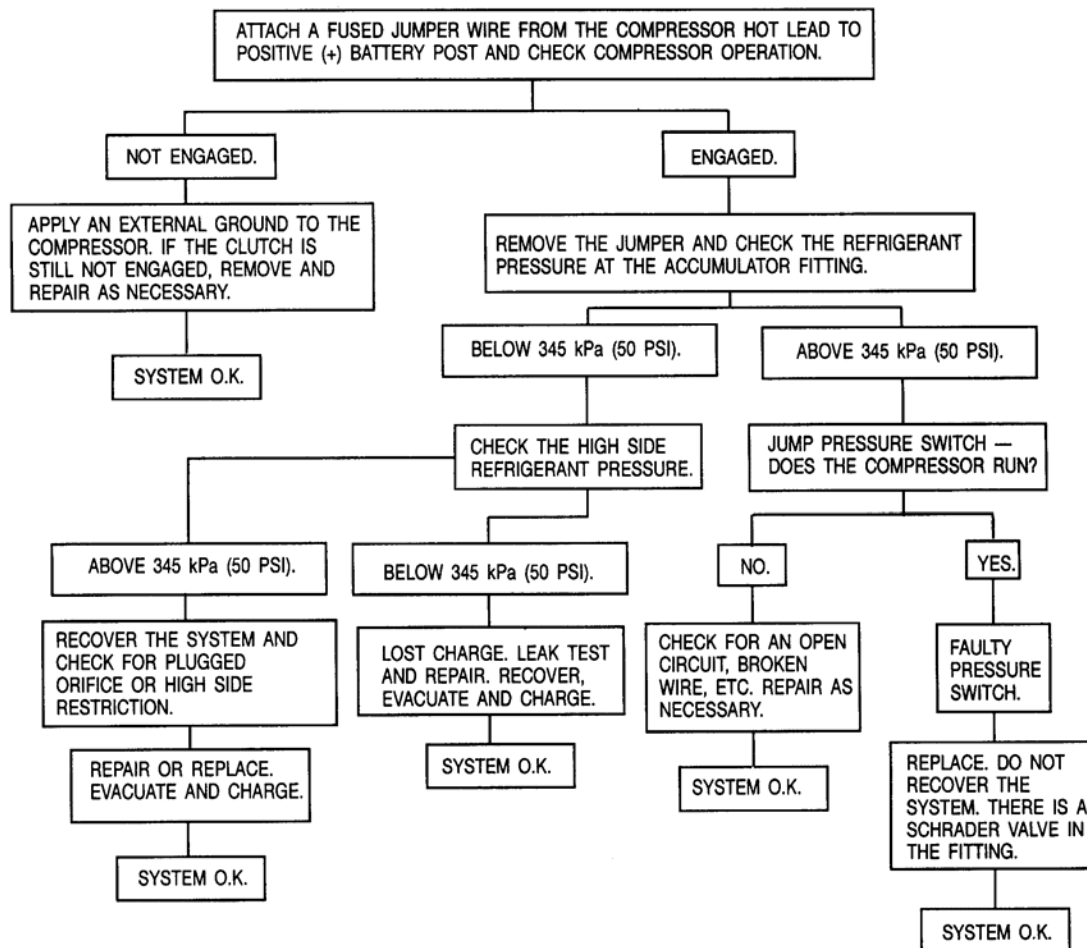


Fig. 1: Insufficient Cooling Chart "A" (CCOT)

Courtesy of GENERAL MOTORS CORP.

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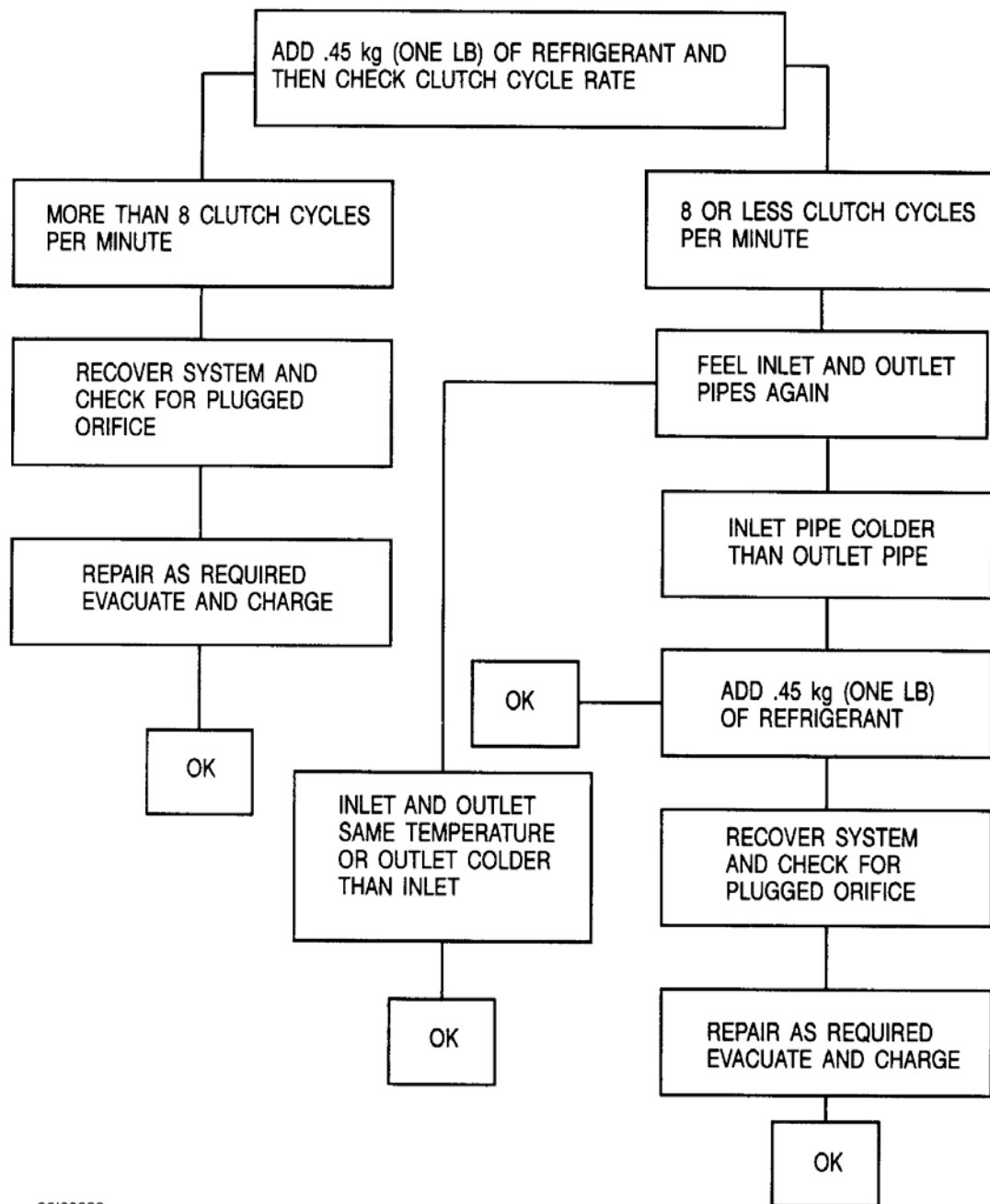


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Fig. 2: Insufficient Cooling Chart "B" (CCOT)
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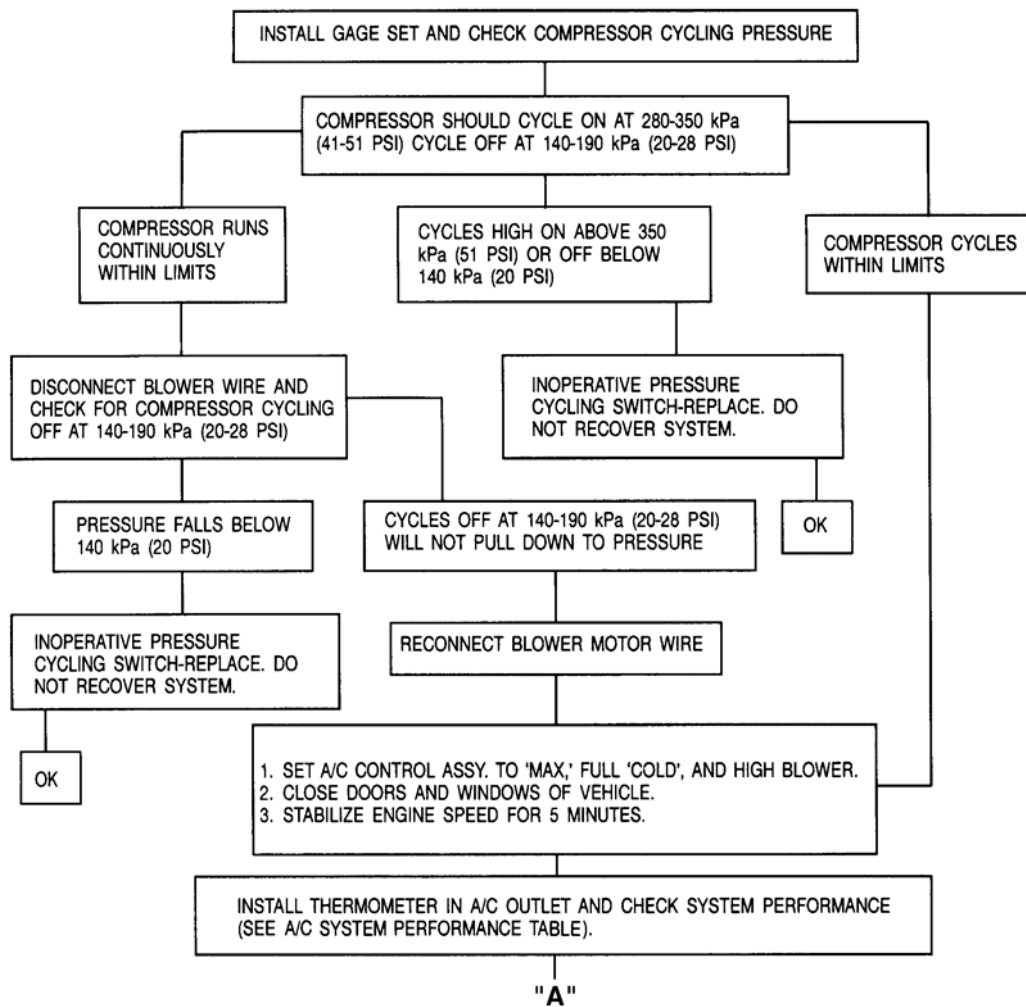


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Fig. 3: Insufficient Cooling Chart "C" (CCOT)
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A/C SYSTEM PERFORMANCE

Relative Humidity %	Ambient Temp. °F (°C)	Max Outlet Temp. °F (°C)
20	70 (21)	43 (6)
	80 (27)	44 (7)
	90 (32)	50 (10)
	100 (38)	51 (11)
30	70 (21)	45 (7)
	80 (27)	47 (8)
	90 (32)	54 (12)
	100 (38)	57 (14)
40	70 (21)	46 (8)
	80 (27)	50 (10)
	90 (32)	57 (14)
	100 (38)	63 (17)
50	70 (21)	48 (9)
	80 (27)	53 (12)
	90 (32)	60 (16)
	100 (38)	69 (21)

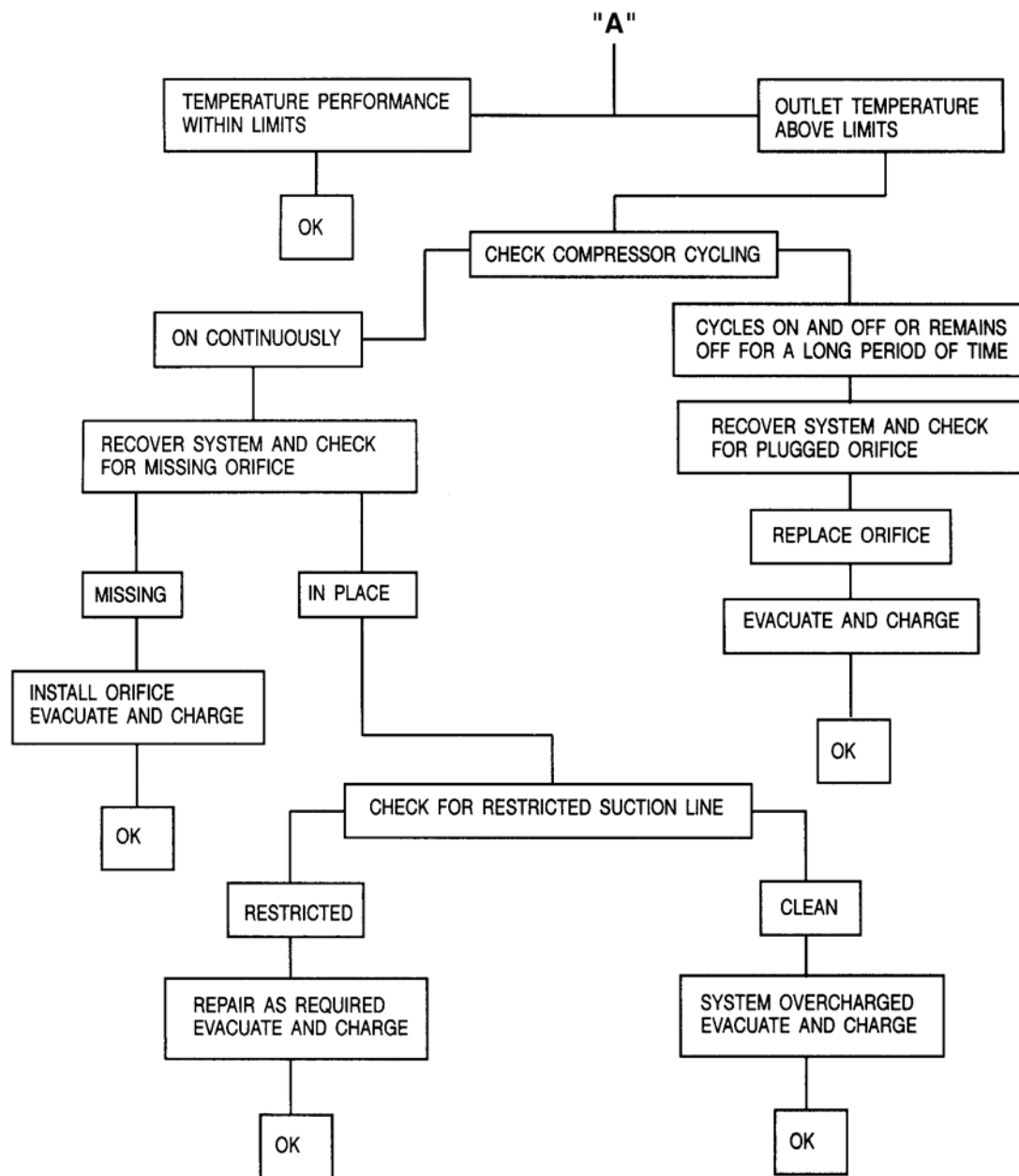
Relative Humidity %	Ambient Temp. °F (°C)	Max Outlet Temp. °F (°C)
60	70 (21)	50 (10)
	80 (27)	56 (13)
	90 (32)	63 (17)
	100 (38)	75 (24)
70	70 (21)	52 (11)
	80 (27)	59 (15)
	90 (32)	67 (19)
	100 (38)	75 (24)
80	70 (21)	53 (12)
	80 (27)	62 (17)
	90 (32)	70 (21)
	100 (38)	75 (24)
90	70 (21)	55 (13)
	80 (27)	65 (18)

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Fig. 4: Insufficient Cooling Chart "D" (CCOT)
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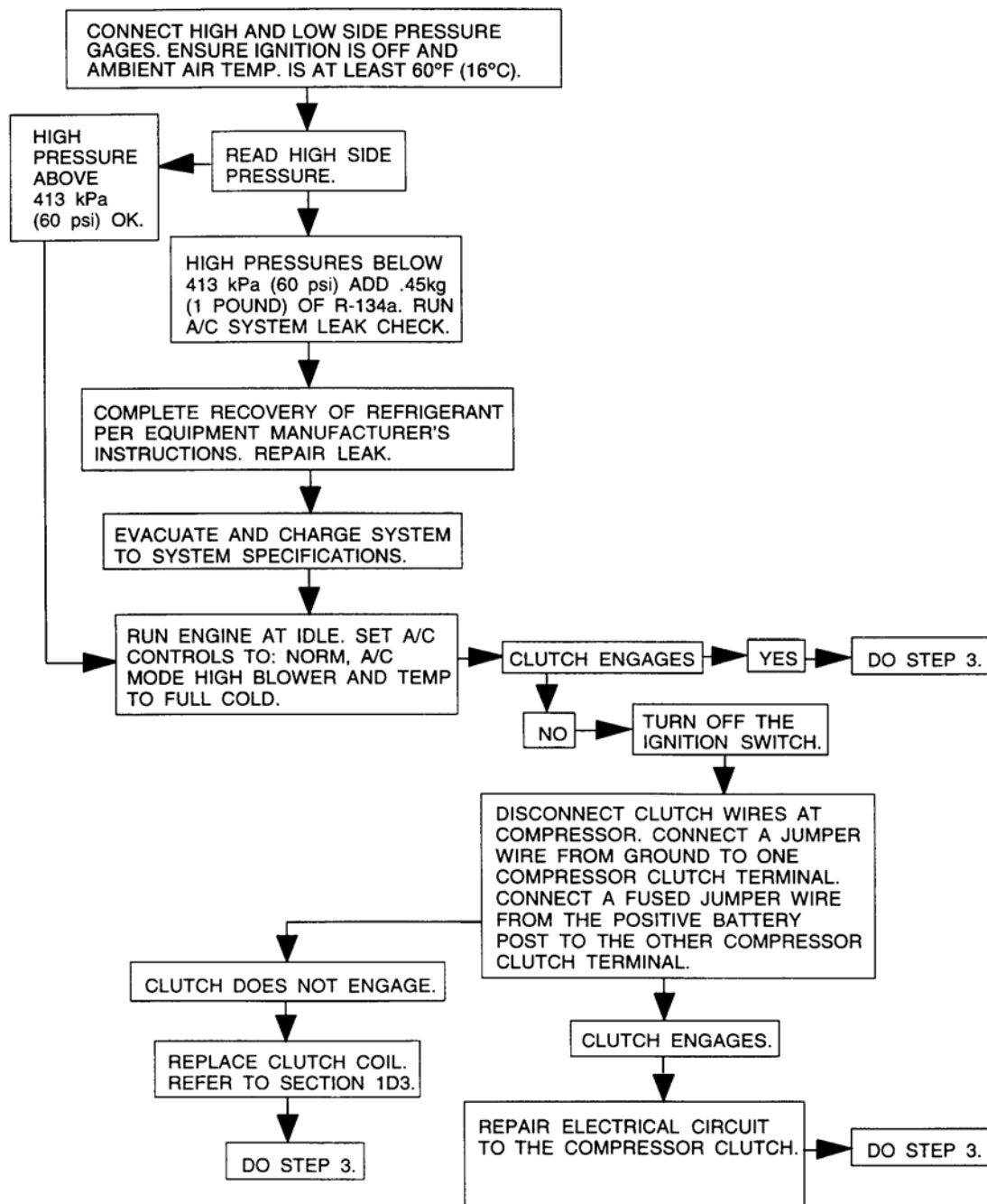
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Fig. 5: Insufficient Cooling Chart "E" (CCOT)
Courtesy of GENERAL MOTORS CORP.

CHECKING REFRIGERANT CHARGE - STEP 2 - (V5/TXV)

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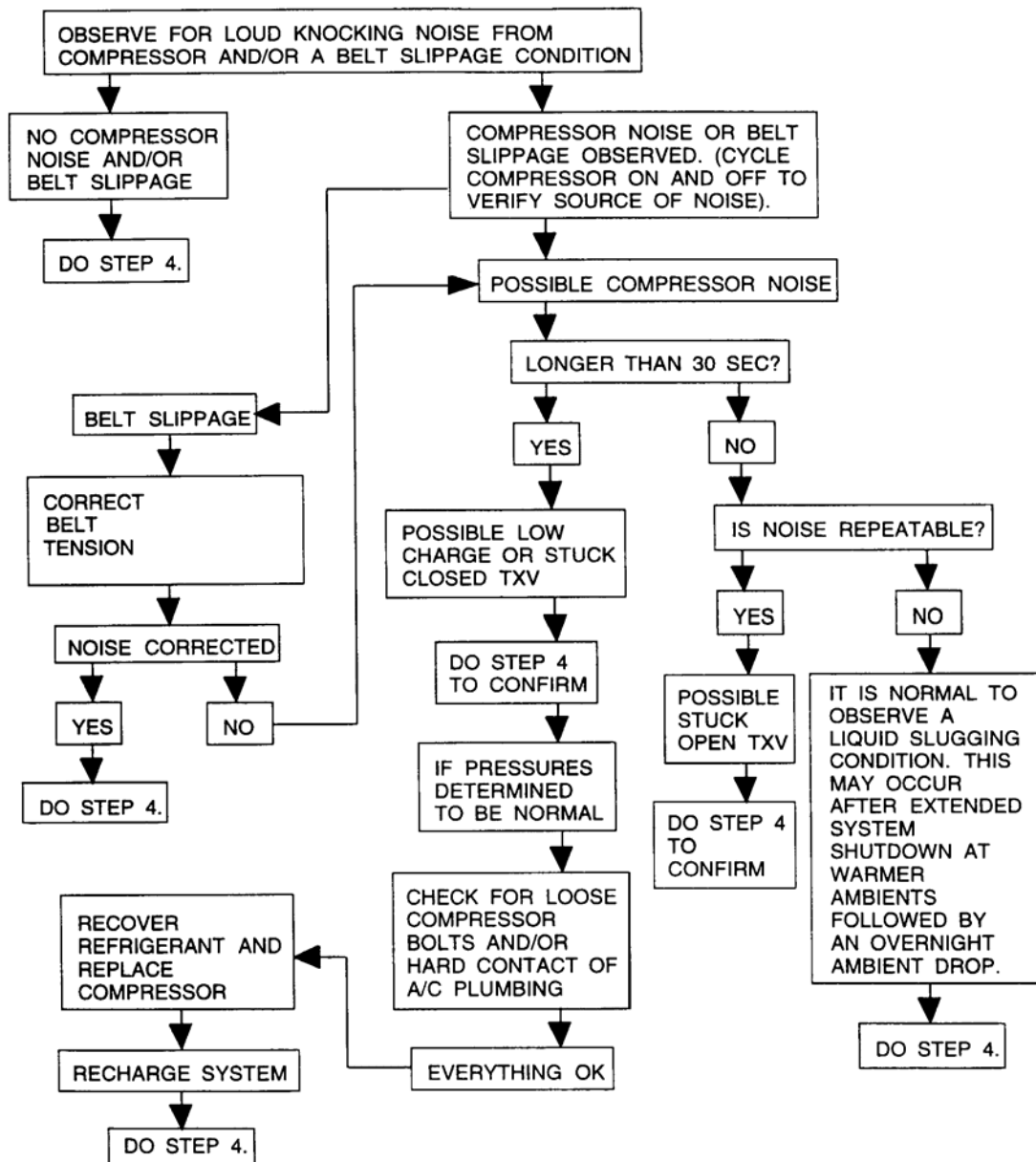
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Fig. 6: Checking Refrigerant Charge - Step 2 (V5/TXV)
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CHECKING COMPRESSOR CLUTCH ENGAGEMENT - STEP 3 - (V5/TXV)

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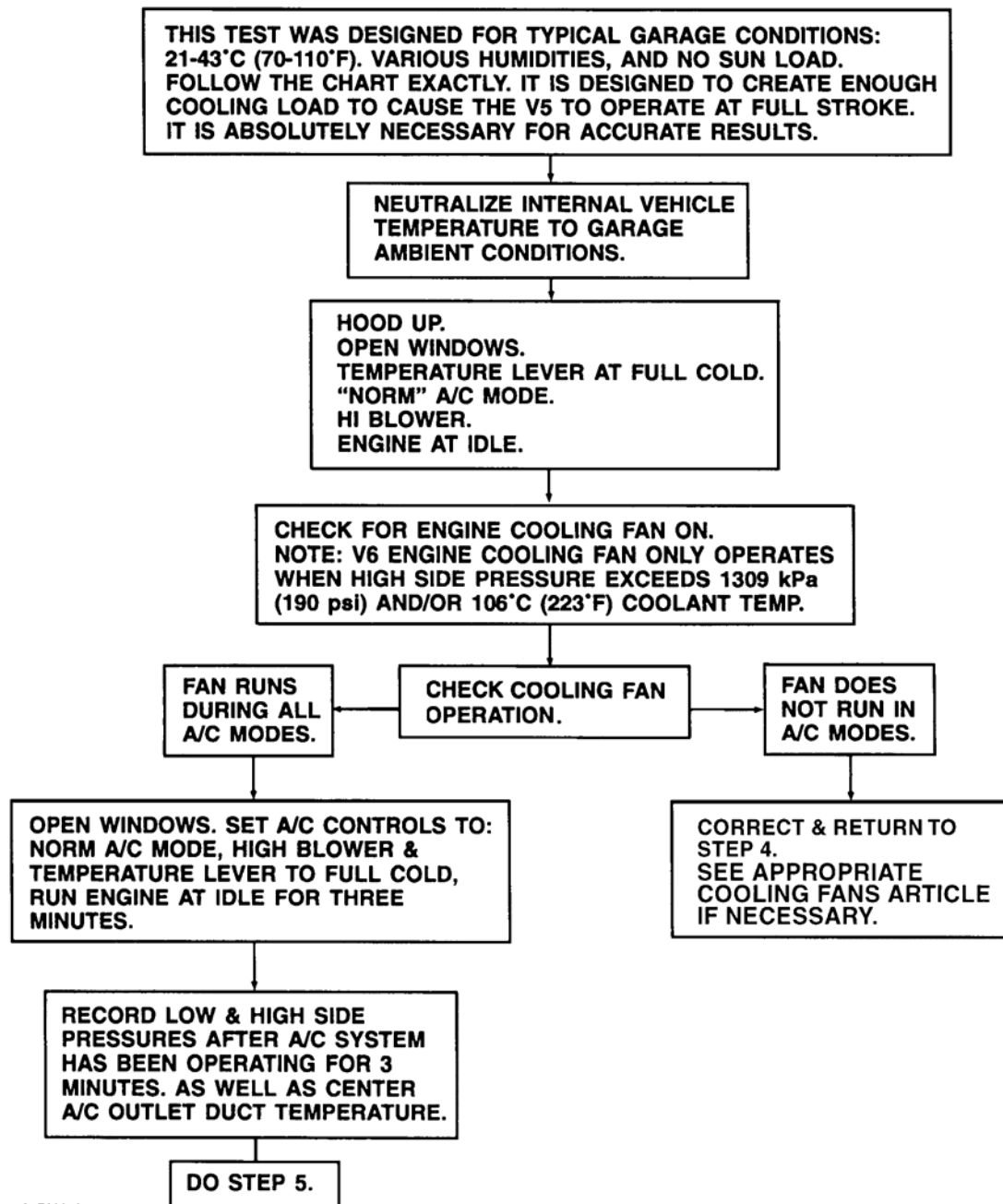
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Fig. 7: Checking Compressor Clutch Engagement - Step 3 (V5/TXV)
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CHECKING PERFORMANCE - STEP 4 - (V5/TXV)

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Fig. 8: Checking Performance - Step 4 (V5/TXV)

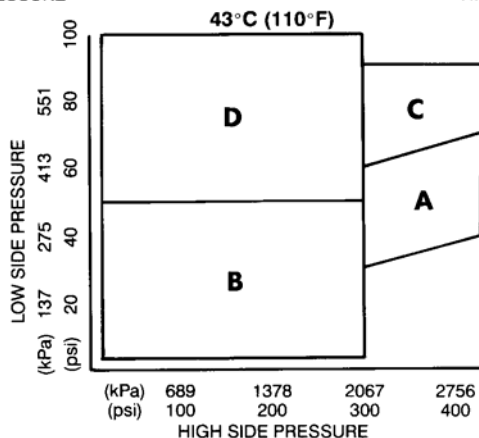
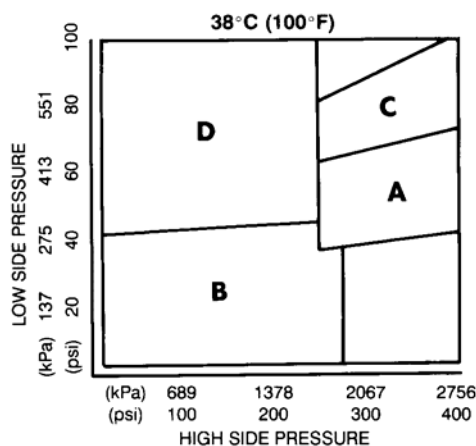
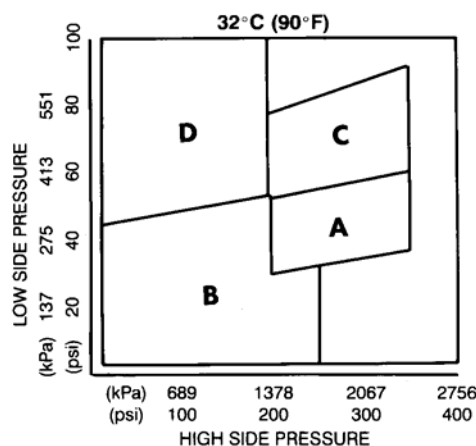
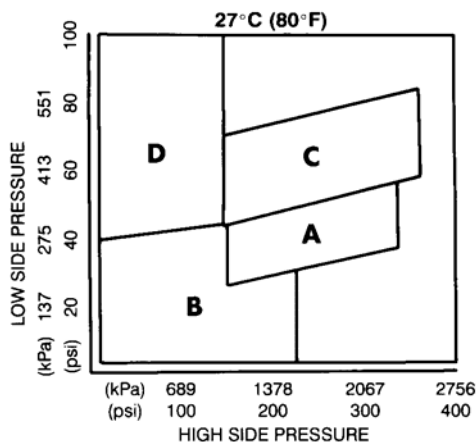
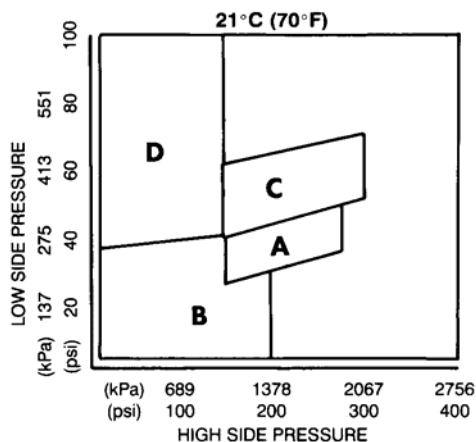
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PERFORMANCE DIAGNOSTIC CHART - STEP 5 - (V5/TXV)

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1. USE THE CHART BELOW WHICH CORRESPONDS TO THE PRESENT AMBIENT TEMPERATURE.
2. READ THE HIGH SIDE AND LOW SIDE PRESSURES AND NOTE THE LETTER CODED AREA IN WHICH THEY INTERSECT.
3. MATCH THE LETTER CODE WITH THE CORRESPONDING LETTER CODE ON THE FOLLOWING PAGE (STEP 6) AND CONTINUE WITH THE DIAGNOSTIC CODE PROCEDURES.



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Fig. 9: Performance Diagnostic Chart - Step 5 (V5/TXV)
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DIAGNOSTIC CODE PROCEDURES - STEP 6 - (V5/TXV)

Refer to appropriate diagnostic code chart (Step 5) for ambient garage conditions.

IF you find...

1. High and Low pressures intersect in area 'A'

THEN the problem may be...

No Problem – Normal System
– Rule of Thumb: Outlet temperature is typically 20°F less than outside air temperatures.

2. High and Low pressures intersect in area 'B'
– may also hear a "motorboat"-like noise inside the vehicle with windows up and with the blower motor on low speed
– may also see rapid fluctuation of low side gage

Low Charge OR Failed Closed TXV
– Evacuate system and weigh charge; if less than 0.8 kg (1.75 lbs.) is removed and there was no rapid fluctuation of the low side gage, then recharge the system to specifications.
– If the charge removed is within specifications, and rapid fluctuation of the low side gage was noted, then replace TXV

3. High and Low pressures intersect in area 'C'
– high and low side pressures equalize quickly upon turning A/C off.
– may also be accompanied with a "slugging" noise upon vehicle start-up

Stuck Open TXV
– Replace TXV

4. High and Low pressures intersect in area 'D'

Destroyed Compressor OR No-Pump Compressor
– Do Step 7 (Next Page) to confirm and follow procedures listed in the diagnostic tree

5. High and Low pressures are higher than normal and the compressor cycles off due to high side pressure in excess of 425 psi. The compressor may re-engage after a period of time and then cycle off again

High Charge
– Complete recovery per equipment manufacture's instructions, evacuate and charge to system specifications

6. An abrupt drop in temperature along the high side plumbing, condenser, or receiver/dryer. The high side should be warm/hot from the compressor discharge all the way to the TXV

High Side Restriction
– Replace component where restriction is occurring

7. System appears to perform normally, but may go warm temporarily on extended drives and recool itself after vehicle shut-down at which time a large puddle of water will be noticed under the vehicle

Evaporator Core Freeze-Up
– Do Step 8 (On page following the next page) to confirm compressor control valve failed low

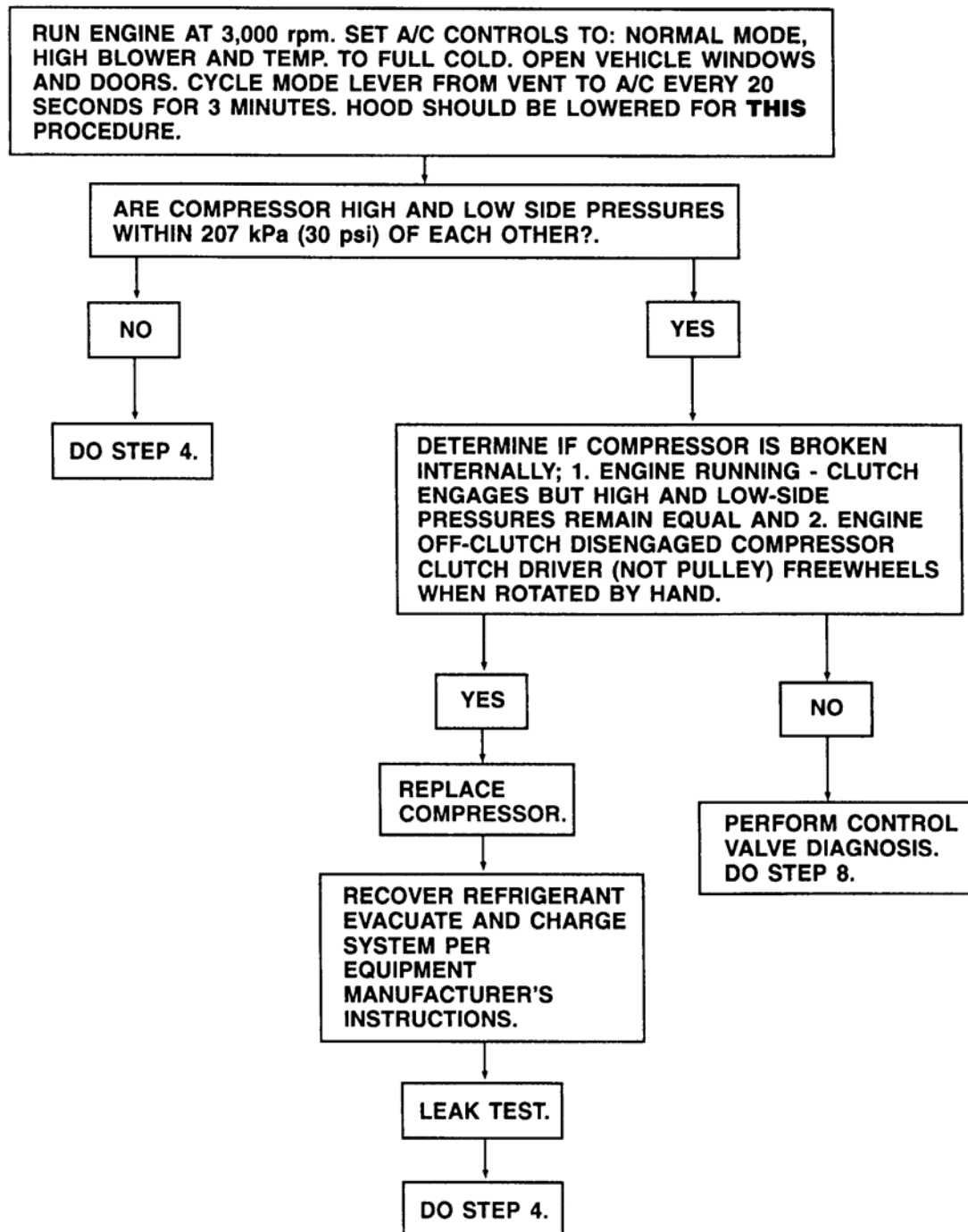
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Fig. 10: Diagnostic Code Procedures - Step 6 (V5/TXV)
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CHECKING FOR NO STROKE COMPRESSOR - STEP 7 - (V5/TXV)

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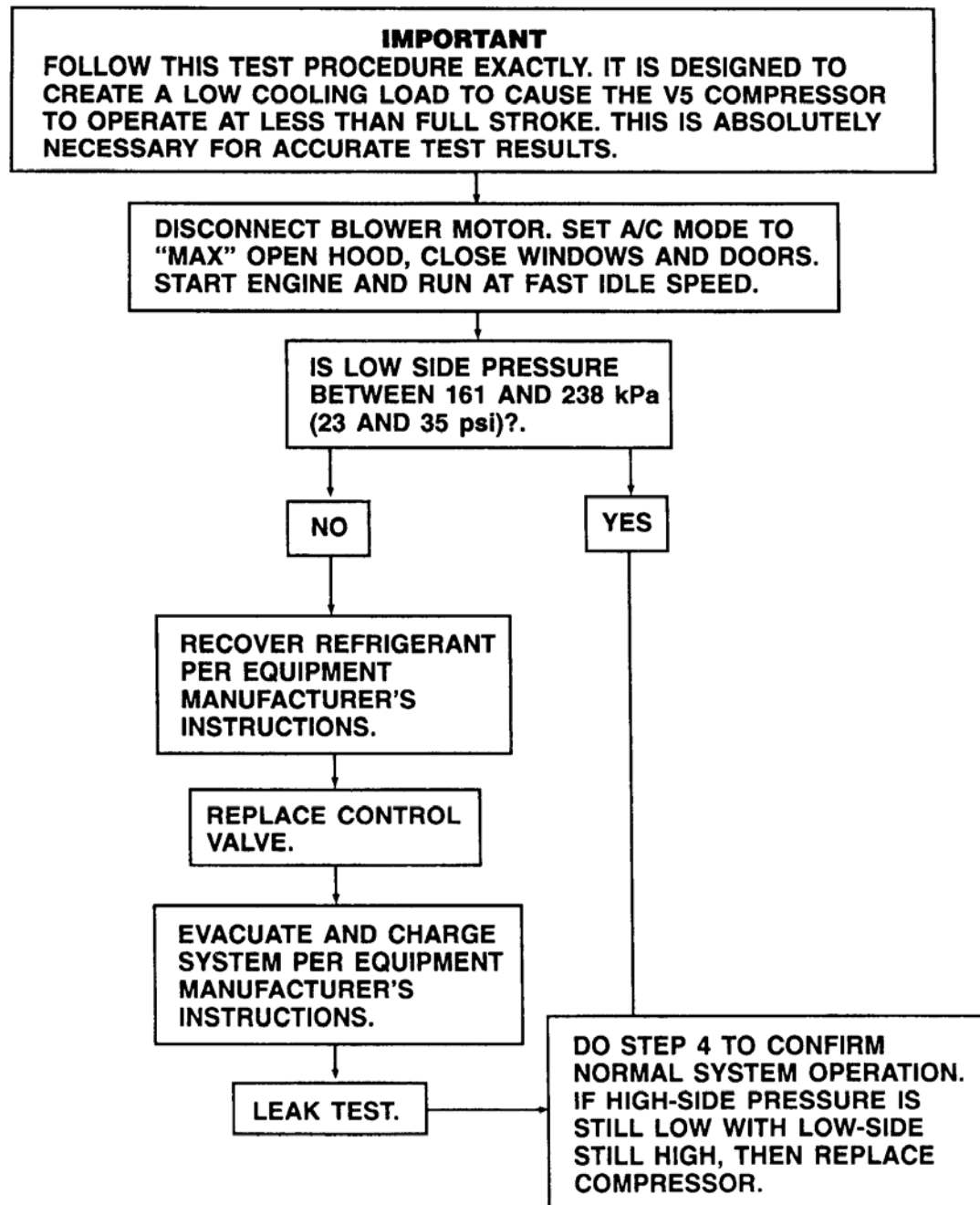
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Fig. 11: Checking For No Stroke Compressor - Step 7 (V5/TXV)
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CONTROL VALVE DIAGNOSIS - STEP 8 - (V5/TXV)

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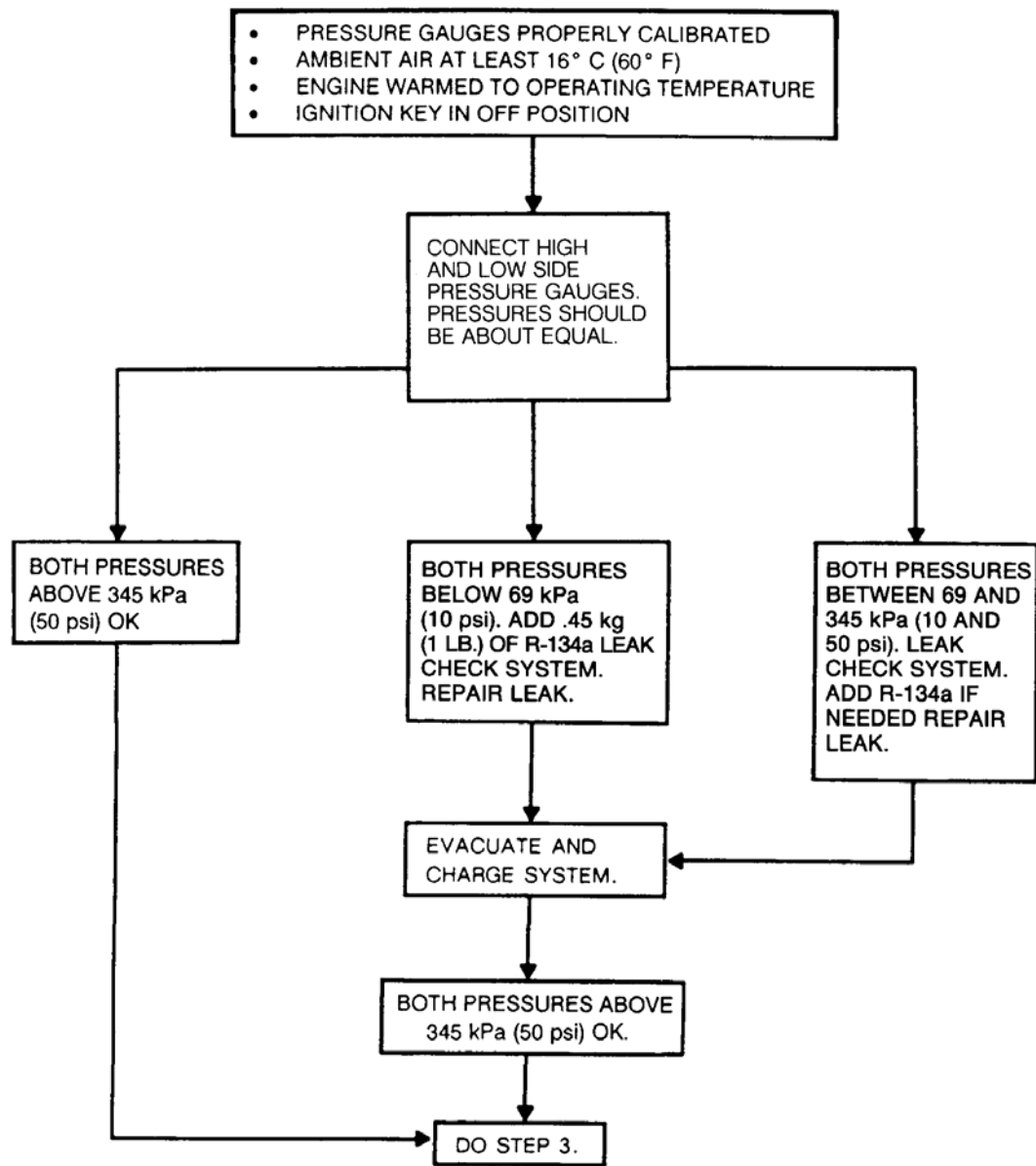
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Fig. 12: Control Valve Diagnosis - Step 8 (V5/TXV)
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CHECKING REFRIGERANT CHARGE - STEP 2 - (V5/VDOT)

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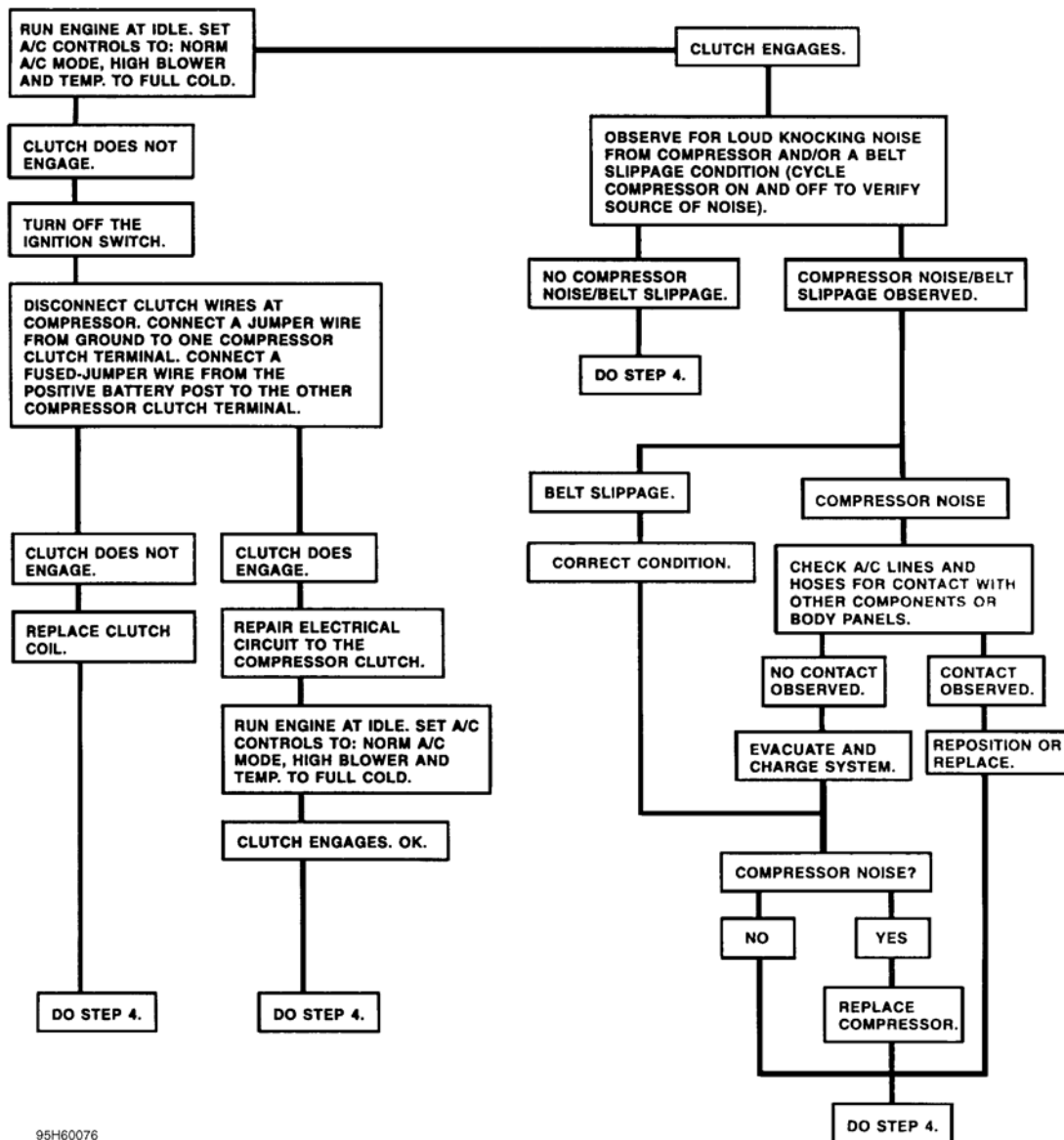
Fig. 13: Checking Refrigerant Charge - Step 2 (V5/VDOT)

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CHECKING COMPRESSOR CLUTCH ENGAGEMENT - STEP 3 - (V5/VDOT)

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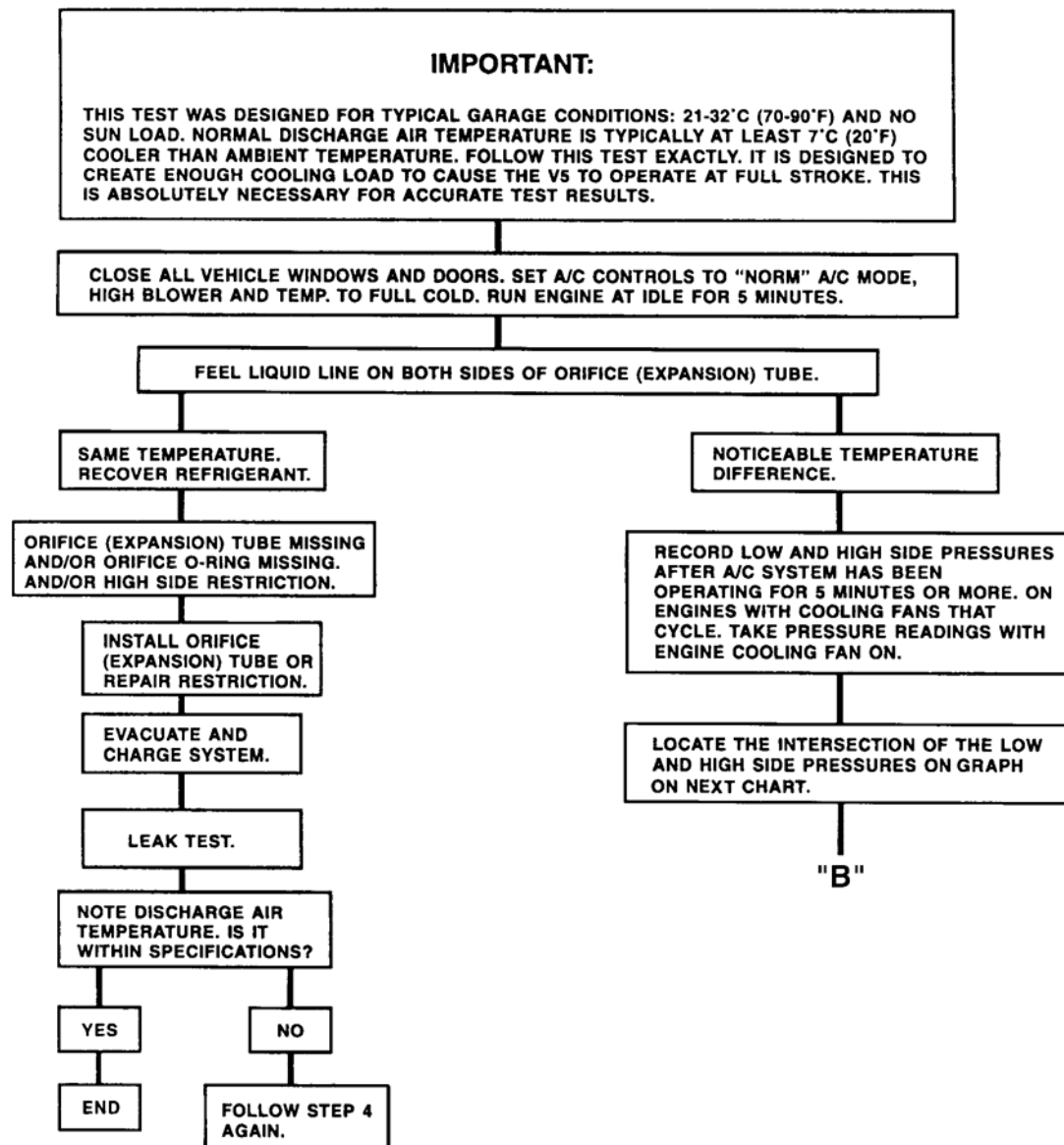
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Fig. 14: Checking Compressor Clutch Engagement - Step 3 (V5/VDOT)
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CHECKING PERFORMANCE - STEP 4 - (V5/VDOT)

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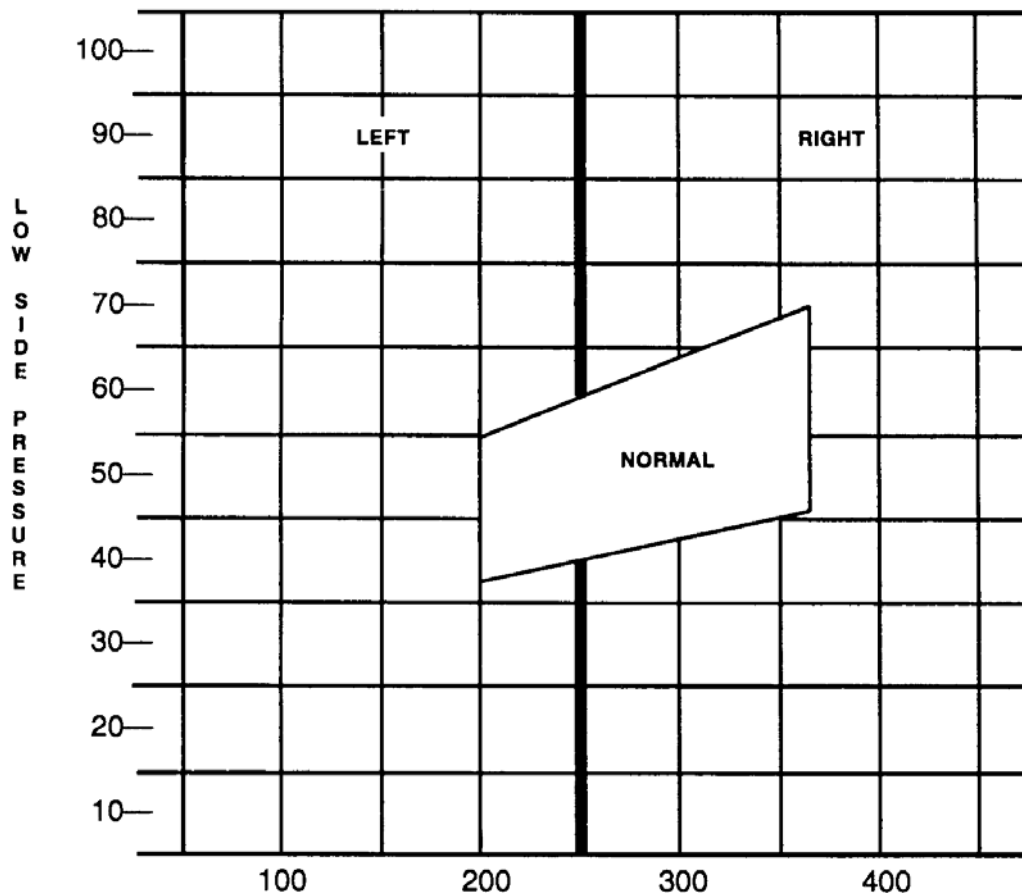


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Fig. 15: Checking Performance - Step 4 (V5/VDOT - 1 Of 2)
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HIGH SIDE PRESSURE

"B"

HUMIDITY AND TEMPERATURE VARIABLES CAN CREATE BORDERLINE DIAGNOSTIC CONDITIONS. IF THE CHART DIRECTS YOU TO FOLLOW PROCEDURES IN ONE STEP, BUT THOSE PROCEDURES DO NOT LEAD YOU TO CORRECT THE PROBLEM, FOLLOW THE PROCEDURES FOR THE OTHER STEP.

LOW AND HIGH SIDE PRESSURES INTERSECT IN THE LEFT AREA OF THE CHART. DO STEP 6.

LOW AND HIGH SIDE PRESSURES INTERSECT IN THE RIGHT AREA OF THE CHART. DO STEP 5.

LOW AND HIGH SIDE PRESSURES INTERSECT IN THE WHITE AREA OF THE CHART. NORMAL AREA MEANS ALL COMPONENTS OF THE REFRIGERANT SYSTEM ARE FUNCTIONING PROPERLY. IF INSUFFICIENT COOLING EXISTS, AIR HANDLING SYSTEM IS AT FAULT.

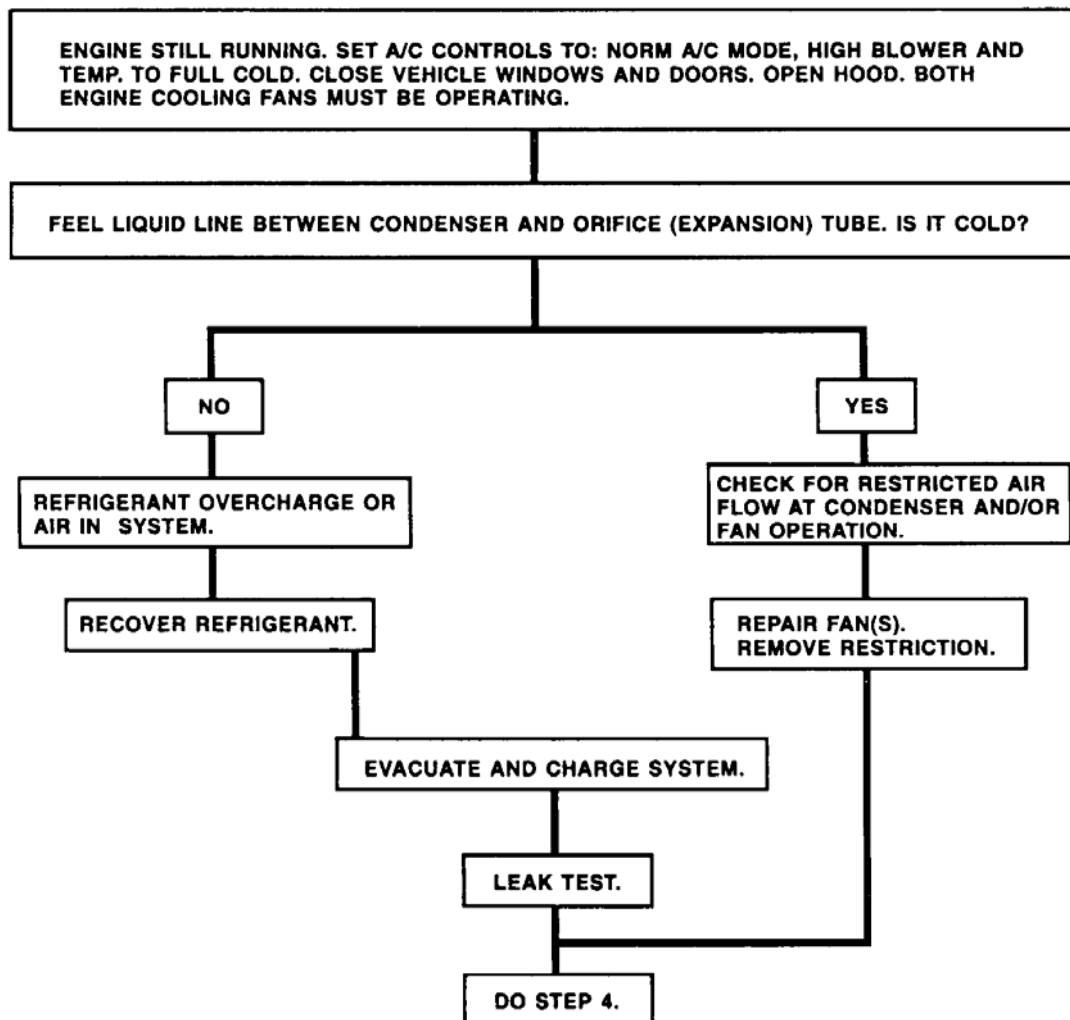
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Fig. 16: Checking Performance - Step 4 (V5/VDOT - 2 Of 2)

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RIGHT AREA DIAGNOSIS & SERVICE - STEP 5 - (V5/VDOT)



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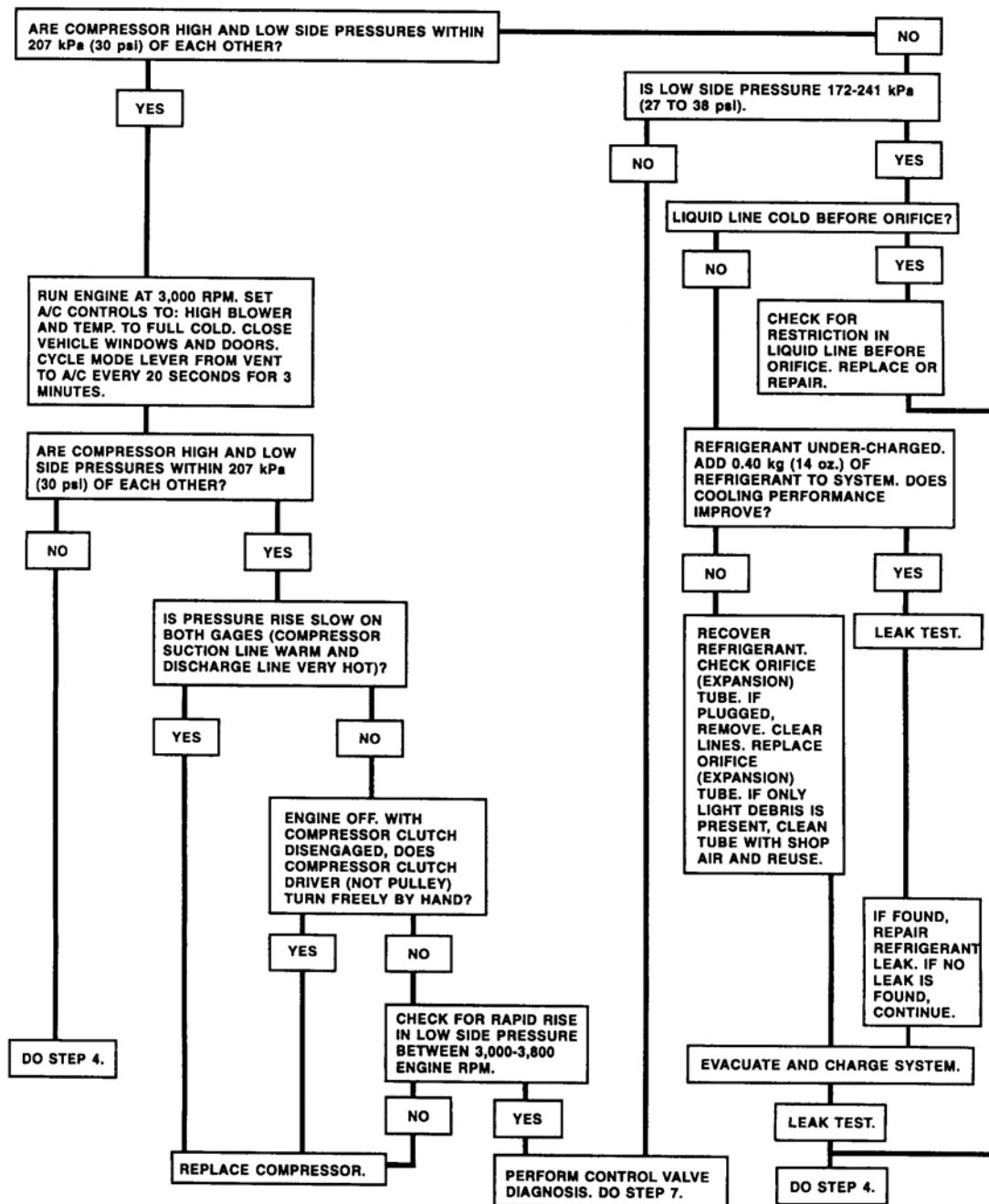
Fig. 17: Right Area Diagnosis & Service - Step 5 (V5/VDOT)

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LEFT AREA DIAGNOSIS & SERVICE - STEP 6 - (V5/VDOT)

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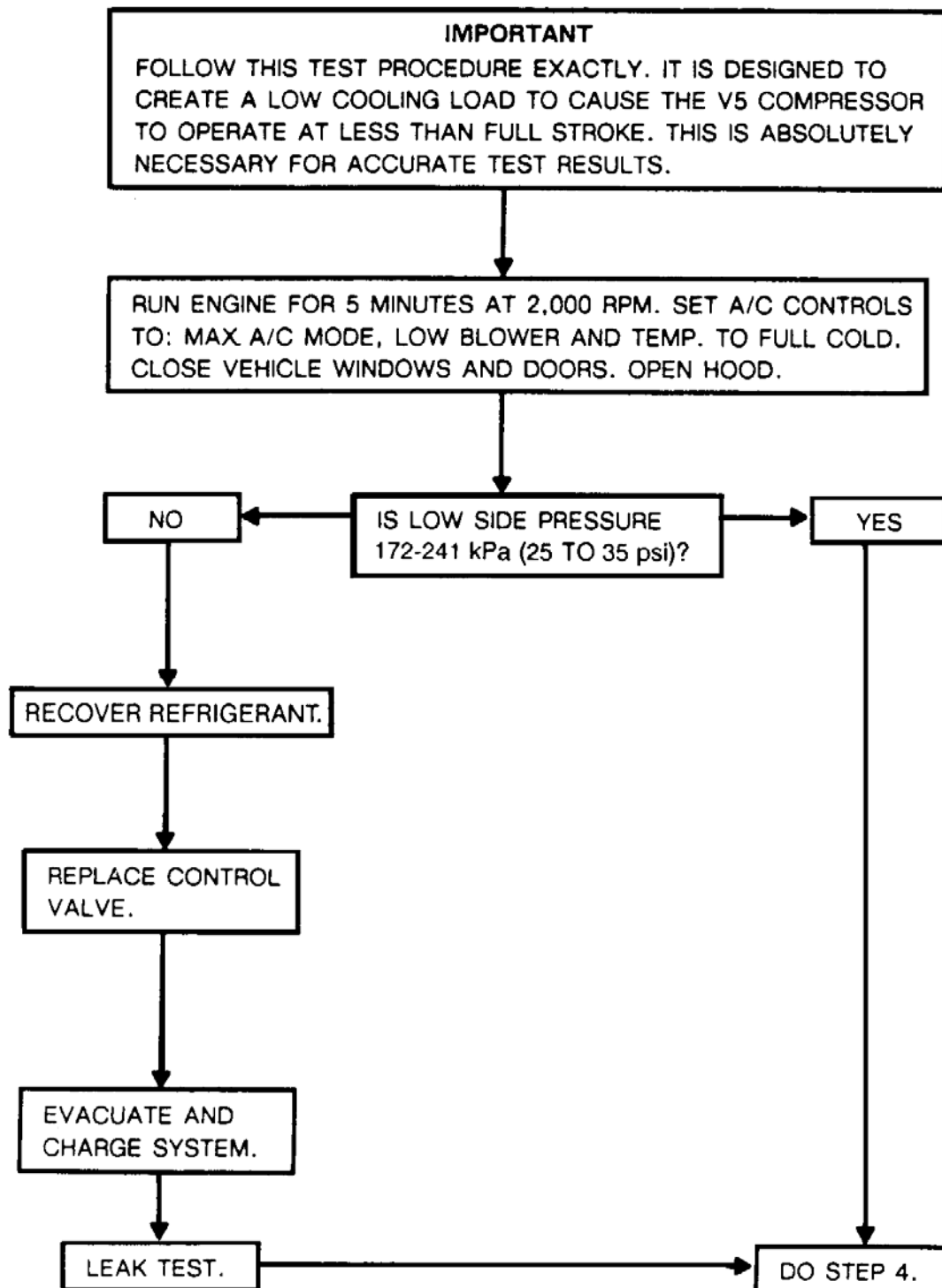
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Fig. 18: Left Area Diagnosis & Service - Step 6 (V5/VDOT)
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CONTROL VALVE DIAGNOSIS - STEP 7 - (V5/VDOT)

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Fig. 19: Control Valve Diagnosis - Step 7 (V5/VDOT)
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